REVIEW ARTICLE

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Pleural Disease

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THE PLEURAL SPACE IS DEFINED BY THE VISCERAL PLEURA, WHICH COVERS the lung, and the parietal pleura, which covers the chest wall, diaphragm, and mediastinum. It is estimated that pleural effusion develops in more than 1.5 million patients each year in the United States, with the majority of cases resulting from congestive heart failure, pneumonia, and cancer.[1] Spontaneous pneumothorax affects approximately 20,000 patients annually in the United States, and the incidence of iatrogenic pneumothorax is similar.[1] Over the past several years, substantial advances have been made in our understanding of pleural biology and related pathophysiology, as well as in the treatment of parapneumonic effusions, empyema, and malignant pleural effusions and in our understanding of the high mortality associated with nonmalignant and transudative effusions. In addition, the definitions and management of pneumothorax have also recently evolved. For these conditions, the goals of patient care are expeditious and efficient diagnosis with minimally invasive interventions that avoid the need for multiple procedures, that minimize hospital days, and that maximize quality of life. This review considers these various aspects of pleural disease.

PLEURAL ANATOMY AND PATHOPHYSIOLOGY

When normal lungs are removed from the chest cavity, their gas volume decreases as a result of elastic recoil. The chest wall, in contrast, when opened to atmospheric pressure at the end of a normal breath (i.e., at functional residual capacity), tends to expand. This balance of physical forces keeps the pressure in the pleural space slightly negative, at approximately −3 to −5 cm of water.[2,3] The physiological function of the pleural space in humans is unclear. One theory maintains that the pleura serves as an elastic serous membrane to allow changes in lung shape with respiration, whereas others suggest that the slightly negative pleural pressure at functional residual capacity prevents atelectasis by maintaining positive transpulmonary pressure.[2,4] Elephants, however, do not have a pleural space; they instead have layers of loose and dense connective tissue between the lung and chest wall, and they seem to do just fine. It is postulated that if elephants did have a pleural space, the pressure gradient between the atmosphere and their submerged thorax (approximately 150 mm Hg) when they are “snorkeling” across a river would both rupture the small pleural capillaries and create large transudative pleural effusions.[5,6] In fact, humans fare quite well after obliteration of the pleural space (pleurodesis), with substantial alleviation of dyspnea if a pleural effusion or pneumothorax had been present. In humans, the parietal and visceral pleura merge at the hilum of the lungs, separating the thorax into two noncontiguous spaces (the hemithoraxes). The North American bison, in contrast, has in some cases been found to have an incomplete mediastinum; this makes it possible to kill these large animals with a single arrow or gunshot to the chest, which creates bilateral pneumothoraxes.[7]